AF/1762

PTO/SB/21 (05-03)
Approved for use through 04/30/2003. OMB 0651-0031
U.S. Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE

TRANSMITTAL FORM

(to be used for all correspondence after initial filing)

Application Number	09/670,189
Filing Date	09/26/2000
First Named Inventor	WHEAT et al.
Art Unit	1762
Examiner Name	Cleveland
Total Number of Pages in This Submission: 72	Attorney Docket Number: 13DV-13658/11593 (21635-0026)

ENCLOSURES *(check all that apply)*

- ☒ Fee Transmittal Form
  - ☐ Fee Attached
- ☐ Amendment / Response
  - ☐ After Final
  - ☐ Affidavits/declaration(s)
- ☐ Extension of Time Request
- ☐ Express Abandonment Request
- ☐ Information Disclosure Statement
- ☐ Certified Copy of Priority Document(s)
- ☐ Response to Missing Parts/ Incomplete Application
  - ☐ Response to Missing Parts under 37 CFR 1.52 or 1.53
- ☐ Assignment Papers *(for an Application)*
- ☐ Drawing(s)
- ☐ Licensing-related Papers
- ☐ Petition
- ☐ Petition to Convert to a Provisional Application
- ☐ Power of Attorney, Revocation Change of Correspondence Address
- ☐ Terminal Disclaimer
- ☐ Request for Refund
- ☐ CD, Number of CD(s) _____
- ☐ After Allowance Communication to Group
- ☐ Appeal Communication to Board of Appeals and Interferences
- ☒ Appeal Communication to Group *(Appeal Notice, Brief, Reply Brief)*
- ☐ Proprietary Information
- ☐ Status Letter
- ☒ Other Enclosure(s) *(please identify below)*:

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Remarks

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT

Firm *or* Individual name	McNees Wallace & Nurick LLC K. Scott O'Brian
Signature	K. Scott O'Brian
Date	October 21, 2003

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PTO/SB/17 (01-03)
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FEE TRANSMITTAL for FY 2003

Effective 01/01/2003. Patent fees are subject to annual revision.

☐ Applicant claims small entity status. See 37 CFR 1.27

TOTAL AMOUNT OF PAYMENT ($) 330 1050

Complete if Known	
Application Number	09/670,189
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METHOD OF PAYMENT (check all that apply)

☐ Check ☐ Credit card ☐ Money Order ☐ Other ☐ None

☒ Deposit Account:

Deposit Account Number: 50-1059

Deposit Account Name: McNees Wallace & Nurick LLC

The Commissioner is authorized to: *(check all that apply)*
☒ Charge fee(s) indicated below ☒ Credit any overpayments
☐ Charge any additional fee(s) during the pendency of this application
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FEE CALCULATION

1. BASIC FILING FEE

Large Entity Fee Code	Large Entity Fee ($)	Small Entity Fee Code	Small Entity Fee ($)	Fee Description	Fee Paid
1001	750	2001	375	Utility filing fee	
1002	330	2002	165	Design filing fee	
1003	520	2003	260	Plant filing fee	
1004	750	2004	375	Reissue filing fee	
1005	160	2005	80	Provisional filling fee	

SUBTOTAL (1) ($) 0

2. EXTRA CLAIM FEES

			Extra Claims		Fee from below		Fee Paid
Total Claims		-20 **	0	X		=	0
Independent Claims		-3 **	0	X		=	0
Multiple Dependent				X		=	0

Large Entity Fee Code	Large Entity Fee ($)	Small Entity Fee Code	Small Entity Fee ($)	Fee Description
1202	18	2202	9	Claims in excess of 20
1201	84	2201	42	Independent claims in excess of 3
1203	280	2203	140	Multiple dependent claim, if not paid
1204	84	2204	42	** Reissue independent claims over original patent
1205	18	2205	9	** Reissue claims in excess of 20 and over original patent

SUBTOTAL (2) ($) 0

**or number previously paid, if greater; For Reissues, see above

FEE CALCULATION (continued)

3. ADDITIONAL FEES

Large Entity Fee Code	Large Entity Fee ($)	Small Entity Fee Code	Small Entity Fee ($)	Fee Description	Fee Paid
1051	130	2051	65	Surcharge - late filing fee or oath	
1052	50	2052	25	Surcharge - late provisional filing fee or cover sheet.	
1053	130	1053	130	Non-English specification	
1812	2,520	1812	2,520	For filing a request for reexamination	
1804	920*	1804	920*	Requesting publication of SIR prior to Examiner action	
1805	1,840*	1805	1,840*	Requesting publication of SIR after Examiner action	
1251	110	2251	55	Extension for reply within first month	
1252	410	2252	205	Extension for reply within second month	
1253	930	2253	465	Extension for reply within third month	
1254	1,450	2254	725	Extension for reply within fourth month	
1255	1,970	2255	985	Extension for reply within fifth month	
1401	320	2401	160	Notice of Appeal	
1402	320	2402	160	Filing a brief in support of an appeal	330
1403	280	2403	140	Request for oral hearing	
1451	1,510	1451	1,510	Petition to institute a public use proceeding	
1452	110	2452	55	Petition to revive – unavoidable	
1453	1,300	2453	650	Petition to revive – unintentional	
1501	1,300	2501	650	Utility issue fee (or reissue)	
1502	470	2502	235	Design issue fee	
1503	630	2503	315	Plant issue fee	
1460	130	1460	130	Petitions to the Commissioner	
1807	50	1807	50	Processing fee under 37 CFR 1.17 (q)	
1806	180	1806	180	Submission of Information Disclosure Stmt	
8021	40	8021	40	Recording each patent assignment per property (times number of properties)	
1809	750	2809	375	Filing a submission after final rejection (37 CFR § 1.129(a))	
1810	750	2810	375	For each additional invention to be examined (37 CFR § 1.129(b))	
1801	750	2801	375	Request for Continued Examination (RCE)	
1802	900	1802	900	Request for expedited examination of a design application	

Other fee (specify) _____

*Reduced by Basic Filing Fee Paid

SUBTOTAL (3) ($) 330 (CD)

SUBMITTED BY				Complete *(if applicable)*	
Name (Print/Type)	K. Scott O'Brian	*Registration No. Attorney/Agent)*	42,946	*Telephone*	717-237-5492
Signature	K. Scott O'Brian			*Date*	October 21, 2003

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This collection of information is required by 37 CFR 1.17 and 1.27. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, Washington, DC 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, Washington, DC 20231.**

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Appeal Brief (filed in triplicate)

Attorney Docket No. 13DV-13658/11593 (21635-0026)
Application No. 09/670,189

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re application of WHEAT et al.	)	
	)	Group Art Unit: 1762
Application No.: 09/670,189	)	
	)	Examiner: Cleveland
Filed: September 26, 2000	)	
	)	

For: METHOD FOR VAPOR PHASE ALUMINIDING INCLUDING A MODIFYING ELEMENT

APPEAL BRIEF

Mail Stop APPEAL BRIEF - PATENTS
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Applicant files its Appeal Brief in triplicate, together with a Fee Transmittal authorizing the charging of the required fee. A Notice of Appeal and fee were previously filed.

Real Party in Interest

The real party in interest is General Electric Company.

Related Appeals and Interferences

Applicant is not aware of any related appeals and/or interferences.

Status of Claims

Claims 1-20 were filed. During prosecution, claims 1, 7-9, 12, and 18-20 were amended. Claims 1-20 are pending, and all claims are rejected. The rejection of all of the claims is appealed. A clean copy of the appealed claims is found in the Appendix hereto.

Status of Amendments

An Amendment After Final Rejection was filed and was entered, per the Advisory Action of October 8, 2003.

Summary of Invention

In an aircraft gas turbine engine, air is drawn into the front of the engine and compressed by an axial-flow compressor. The air is mixed with fuel, and the mixture burned in the combustors. The hot combustion gas flows axially from the combustors and through a turbine. The turbine causes a shaft to turn, and this shaft drives the compressor. The hot exhaust gas flows from the back of the engine. [first paragraph of the Background section of the Specification].

The turbine blades 20 (Figure 2, presented as an example of article of interest), against which the hot combustion gas impacts, are typically made of a nickel-base superalloy substrate 42 covered with an aluminum-containing protective layer 40, 46. The protective layer 40, 46 oxidizes to form a surface scale 43 of aluminum oxide, which protects the protective layer 40, 46 and the underlying superalloy substrate 42 against further oxidation and corrosion damage.

The present invention deals with the method by which the aluminum-containing protective layer 40 or 46 is deposited. Referring to claim 1 and the discussion associated with Figure 3, the uncoated article, in the preferred case the turbine blade 20, is provided. A coating source is prepared. The coating source comprises (1) a solid aluminum halide,

(2) a solid fluoride or a solid iodide of a modifying element as a source of the modifying element, where the modifying element is zirconium, hafnium, or yttrium, or combinations thereof, and (3) a carrier gas. A coating gas is produced from the coating source. The coating gas comprises a gaseous aluminum halide, a gaseous fluoride or a gaseous iodide of the modifying element, and the carrier gas. The coating gas is contacted to the article, and simultaneously the coating gas and the article are heated to a coating temperature of at least about 1850°F for a period of time sufficient to permit aluminum and the modifying element to coat onto the surface of the article. This coating operation is conveniently performed in an apparatus such as that of Figures 4 or 5.

Issues

Issue 1. Are claims 1-2 and 4-11 properly rejected under 35 USC 103 over Warnes '733 in view of Basta '963 and Smith '400?

Issue 2. Are claims 3 and 12-20 properly rejected under 35 USC 103 over Warnes '733 in view of Basta '963 and Smith '400, and further in view of Basta '614?

Issue 3. Are claims 1, 3, 5-7, 9, 11-12, 15, 17-18 and 20 properly rejected under 35 USC 103 over Chang '642, Speirs '806, and Bornstein '023?

Grouping of Claims

The claims do not stand or fall together, except as stated next.

Under Issue 1, claim 2 stands or falls with claim 1.

Under Issue 2, claim 13 stands or falls with claim 12.

Under Issue 3, claims 3, 5, 6, 9, and 11 stand or fall with claim 1.

Under Issue 3, claims 15, 17, and 20 stand or fall with claim 12.

Argument

References to the "Office Action" are to the final Office Action of April 25, 2003.

Issue 1. Are claims 1-2 and 4-11 properly rejected under 35 USC 103 over Warnes '733 in view of Basta '963 and Smith '400?

Warnes '733 teaches (col. 6, lines 12-37) depositing an aluminum-containing layer by passing a mixture of hydrogen and hydrogen chloride gases over a source of aluminum and a source of silicon to produce a mixture of aluminum trichloride and silicon tetratrichloride. Separately, a mixture of argon and hydrogen chloride gases are flowed over a hafnium/zirconium bed (hafnium and zirconium are the modifying elements) to form a gaseous mixture containing hafnium tetrachloride gas and zirconium trichloride gas. The two gas mixtures, one containing aluminum trichloride and silicon tetratrichloride, and the other containing hafnium tetrachloride gas and zirconium trichloride gas, are introduced concurrently into a coating retort that contains the article to be coated. Warnes thus teaches that the aluminum trichloride, the hafnium tetrachloride, and the zirconium trichloride are never in a solid form, directly contrary to the recitations of the claims.

Basta '963 teaches that "hafnium halides" and "zirconium halides" may be present in a coating system in gaseous form (col. 9, lines 27-28), not solid form as recited in the claims. The explanation of the rejection (sentence bridging pages 3-4 of the Office Action) mischaracterizes Basta '963 as teaching that "...metal fluorides, including those of aluminum, hafnium, and zirconium, may be used as CVD precursors". This statement is not correct. There is no teaching, anywhere in Basta '963 or the other art of record, mentioning hafnium fluoride or zirconium fluoride, possible compounds within the scope of the present claims.

There is a temptation in the enthusiasm of attempting to construct a hindsight rejection of a claim, to which the present explanation of the rejection has fallen victim, to blur the distinction between different types of halides. In fact, the present Specification states unequivocally, "The chlorides and bromides of the modifying element are not within the scope of the present invention, as they are not thermodynamically and kinetically suitable." and "The iodides of the modifying elements may be used in some circumstances,

but the chlorides and bromides are unsuitable and may not be used." So it is not sufficient to argue that Basta '963 or other references teach "halides" of hafnium or zirconium, but in fact they must expressly teach fluorides and/or iodides, because the present Specification distinguishes between different types of halides.

Smith '400 teaches an approach for depositing kappa aluminum oxide (col. 5, lines 14-37). In that process, aluminum chloride is generated by evaporation of the solid or liquid, or reaction of aluminum metal with chlorine or hydrogen chloride. The resulting aluminum chloride is mixed with water vapor and titanium tetrachloride gas. The mixture is passed into a reaction chamber and contacted to a sintered cemented carbide, resulting in the deposition of kappa aluminum oxide on the sintered cemented carbide.

The following principle of law applies to all Section 103 rejections. MPEP 2143.03 provides, "To establish prima facie obviousness of a claimed invention, all claim limitations must be taught or suggested by the prior art. In re Royka, 490 F2d 981, 180 USPQ 580 (CCPA 1974). All words in a claim must be considered in judging the patentability of that claim against the prior art. In re Wilson, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970)." [emphasis added] That is, to have any expectation of rejecting the claims over a single reference or a combination of references, each limitation must be taught somewhere in the applied prior art. If limitations are not found in any of the applied prior art, the rejection cannot stand. In this case, the applied prior art references clearly do not arguably teach some limitations of the claims.

Claim 1 recites in part:

> "preparing a coating source comprising:
>
> a solid aluminum halide,
>
> a solid fluoride or a solid iodide of a modifying element as a source of the modifying element, the modifying element being selected from the group consisting of zirconium, hafnium, and yttrium, and

combinations thereof, and

a carrier gas;

producing a coating gas from the coating source, the coating gas comprising a gaseous aluminum halide, a gaseous fluoride or a gaseous iodide of the modifying element, and the carrier gas;"

There is no teaching in any of the references of "a coating source comprising a solid aluminum halide, a solid fluoride or a solid iodide of a modifying element..., and a carrier gas." Warnes teaches that the aluminum trichloride, the hafnium tetrachloride, and the zirconium trichloride are present only as gases. None of these compounds are ever present as solids. Smith is relied upon for a teaching that aluminum halide gas may be produced by evaporating the solid aluminum halide in a completely different application, but there is no teaching regarding a solid fluoride or a solid iodide of a modifying element. There is also no reason to substitute the approach of Smith for that taught by Warnes. Basta '963 is relied upon for a teaching of "metal fluorides, including those of aluminum, hafnium, and zirconium", but there is no such teaching in Basta '963. Basta '963 teaches aluminum trifluoride and "hafnium halides" and "zirconium halides", in gaseous form (col. 8, lines 23-32). Basta '963 has absolutely no teaching of hafnium fluoride, zirconium fluoride, hafnium iodide, or zirconium iodide, either in a solid or even a gaseous form.

In short, there is no teaching, in any of the references, of "a solid fluoride or a solid iodide of a modifying element as a source of the modifying element, the modifying element being selected from the group consisting of zirconium, hafnium, and yttrium, and combinations thereof", as recited in claim 1. Consequently, there can be no teaching of "a coating source comprising a solid aluminum halide, a solid fluoride or a solid iodide of a modifying element..., and a carrier gas", as recited in claim 1.

The distinction between whether the modifying element is initially provided in the coating source in a solid or gaseous form is an important one. The use of a gaseous coating source requires special apparatus to generate the gas, which is then supplied to the coating

apparatus. When a solid aluminum halide and a solid source of the modifying element are used, the solids may be placed directly into the coating apparatus or placed directly in contact with the surface to be coated.

Turning to the dependent claims, claim 2 stands or falls with claim 1.

Claim 4 recites in part: "the aluminum halide is aluminum trifluoride", meaning that the solid aluminum halide in the coating source of claim 1 is solid aluminum trifluoride. Warnes teaches the use of gaseous aluminum trichloride. Basta '963 teaches gaseous aluminum trifluoride but not solid aluminum trifluoride, and Smith has no teaching of aluminum trifluoride at any location.

Claim 5 recites in part: "the fluoride of the modifying element is used, and the fluoride of the modifying element is a tetrafluoride of the modifying element", meaning that the solid form of the modifying element in claim 1 is a solid tetrafluoride of the modifying element. None of the references has any such teaching. Warnes teaches using gaseous chlorides of zirconium and hafnium. Basta '963 teaches using gaseous "halides" of zirconium and hafnium, with no mention of fluorides. Smith has no relevant teaching.

Claim 6 recites in part: "the coating source further includes elemental solid aluminum". Warnes teaches the presence of elemental solid aluminum in its approach for generating aluminum trichloride. However, recall that the rejection of claim 1 was developed by arguing that "it would have been obvious...to have provided the metal halide by physical evaporation instead of by reaction of metal with HCl..." (Office Action, page 3, lines 21-23). The formation of the rejection can't have it both ways--eliminate the metal to try to form the rejection of claim 1, but then bring it back to try to reject claim 6. The two gas-producing technologies are redundant, and there is no reason to use both of them. The explanation of the rejection argues that it would be obvious to use both methods together, but that won't work technically. As stated at col. 4, lines 39-40 of Basta '963, when hydrogen fluoride gas is passed over aluminum pellets to make aluminum trifluoride, the

pellets are at 90°C. This is well below the melting point (much less the boiling point) of solid aluminum trifluoride, so the aluminum trifluoride won't vaporize at the 90°C mandated for reaction of the aluminum pellets. So the two processes are not physically compatible.

Claim 7 recites in part: "the coating source further includes an elemental solid modifying element". Warnes teaches the presence of the elemental solid modifying element in its approach for generating the trichloride of the modifying element. However, recall that the rejection of claim 1 was developed by arguing that "it would have been obvious...to have provided the metal halide by physical evaporation instead of by reaction of metal with HCl..." (Office Action, page 4, lines 2-5). The formation of the rejection can't have it both ways--eliminate the metal to try to form the rejection of claim 1, but then try to bring it back to reject claim 7. The two gas-producing technologies are redundant, and there is no reason to use both of them.

Claim 8 recites in part: "the step of preparing the coating source includes the step of providing the solid fluoride or the solid iodide of the modifying element separated from the article surface". As noted earlier, none of the references has any teaching of a solid fluoride or a solid iodide of the modifying element (hafnium or zirconium). There may therefore be no teaching of the limitation of claim 8, since there is no solid form of either of these compounds. The explanation of the rejection (Office Action page 4, lines 15-18) seems to presuppose that there is such a teaching in the references, but there is not.

Claim 9 recites in part: "the step of preparing the coating source includes the step of providing the fluoride or the iodide of the modifying element applied directly to the article surface". The references do not teach solid fluorides or iodides of the modifying elements, as discussed earlier. According to the recitation of claim 1, the fluoride or iodide in the coating source is a solid. The argument presented in the explanation of the rejection (Office Action, page 4, line 18), "The precursor then flows to (i.e., is applied to) the substrate." is not technically possible, because the solid components of the coating source

cannot "flow to" the substrate--they are solids.

Claim 10 recites in part: "the modifying element is zirconium". This is the modifying element that is recited in claim 1 to be provided in the form of a solid fluoride or a solid iodide. None of the references have any teaching of a solid fluoride or iodide of zirconium.

Claim 11 recites in part: "the modifying element is hafnium". This is the modifying element that is recited in claim 1 to be provided in the form of a solid fluoride or a solid iodide. None of the references have any teaching of a solid fluoride or iodide of hafnium.

The present rejection seeks to perform a hindsight reconstruction based upon unrelated references, which is technically unsupported and is legally improper. The case authority and the MPEP provide guidance on this point. The present rejection is a Section 103 combination rejection. It is well established that a proper Section 103 combination rejection requires more than just finding in the references the elements recited in the claim (but which was not done here). To reach a proper teaching of an article or process through a combination of references, there must be stated an objective motivation to combine the teachings of the references, not a hindsight rationalization in light of the disclosure of the specification being examined. MPEP 2143 and 2143.01. See also, for example, In re Fine, 5 USPQ2d 1596, 1598 (at headnote 1) (Fed.Cir. 1988), In re Laskowski, 10 USPQ2d 1397, 1398 (Fed.Cir. 1989), W.L. Gore & Associates v. Garlock, Inc., 220 USPQ 303, 311-313 (Fed. Cir. 1983), and Ex parte Levengood, 28 USPQ2d 1300 (Board of Appeals and Interferences, 1993); Ex parte Chicago Rawhide Manufacturing Co., 223 USPQ 351 (Board of Appeals 1984). As stated in In re Fine at 5 USPQ2d 1598:

> "The PTO has the burden under section 103 to establish a prima facie case of obviousness. [citation omitted] It can satisfy this burden only by showing some objective teaching in the prior art or that knowledge

> generally available to one of ordinary skill in the art would lead that individual to combine the relevant teachings of the references."

And, at 5 USPQ2d 1600:

> "One cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention."

Following this authority, the MPEP states that the examiner must provide such an objective basis for combining the teachings of the applied prior art. In constructing such rejections, MPEP 2143.01 provides specific instructions as to what must be shown in order to extract specific teachings from the individual references:

> "Obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention when there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. In re Fine, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988); In re Jones, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992)."
>
> * * * * *
>
> "The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination." In re Mills, 916 F.2d 680, 16 USPQ2d 1430 (Fed. Cir. 1990)."
>
> * * * * *
>
> "A statement that modifications of the prior art to meet the claimed invention would have been 'well within the ordinary skill of the art at the time the claimed invention was made' because the references relied upon teach that all aspects of the claimed invention were individually known in the art is not sufficient to establish a prima facie case of obviousness

without some objective reason to combine the teachings of the references. Ex parte Levengood, 28 USPQ2d 1300 (Bd.Pat.App.& Inter. 1993)."

Here, there is set forth no objective basis for combining the teachings of the references in the manner used by this rejection, and selecting the helpful portions from each reference while ignoring the unhelpful portions. An objective basis is one set forth in the art or which can be established by a declaration, not one that can be developed in light of the present disclosure. The various processes of the three references are not technically compatible for reasons discussed earlier, and no reason is suggested for combining the teachings.

Issue 2. Are claims 3 and 12-20 properly rejected under 35 USC § 103 over Warnes '733 in view of Basta '963 and Smith '400, and further in view of Basta '614?

Applicant incorporates the prior discussion of Issue 1 in regard to the rejections formed of the combination of Warnes '733, Basta '963, and Smith '400. Basta '614 is relied upon for its teaching of applying coatings to airfoils.

Claim 3 depends from claim 1, and incorporates the limitation quoted above from claim 1. The combination of Warnes '733, Basta '963, and Smith '400 do not teach these limitations, and Basta '614 adds nothing in this regard. Basta '614 uses a coating approach like that of Warnes '733, in which the aluminum trichloride gas is formed external to the coating retort by passing hot gas over pure aluminum (col. 4, lines 33-43). Claim 3 is allowable over this ground of rejection.

Claim 12 recites in part:

> "preparing a coating source comprising:
>
> a solid aluminum halide,
>
> a solid fluoride of a modifying element as a source of the modifying element, the fluoride of the modifying element being selected from the group consisting of a zirconium fluoride and a hafnium fluoride, and combinations thereof, and
>
> a carrier gas;
>
> producing a coating gas from the coating source, the coating gas comprising a gaseous aluminum halide, a gaseous fluoride or a gaseous iodide of the modifying element, and the carrier gas;"

The combination of Warnes '733, Basta '963 and Smith '400 does not teach this limitation for the reasons discussed earlier. Applicant incorporates by reference the earlier discussion of the rejection of Issue 1. Basta '614 adds nothing in this regard, as it teaches the same thing as Warnes '744 in respect to the coating process.

Basta '614 is applied for its teaching of the use of platinum to make platinum aluminide coatings. Applicant does not dispute the fact that platinum aluminide coatings are known in the art on nickel-base superalloy airfoils. Basta '614 does not, however, remedy the absence of teachings in the other three references.

Claim 13 stands or falls with claim 12.

Claim 14 recites in part: "the modifying element is zirconium tetrafluoride", meaning that the solid form of the modifying element in claim 12 is solid zirconium tetrafluoride. None of the references has any such teaching. Warnes teaches using gaseous zirconium chloride, not solid zirconium tetrafluoride. Basta '963 teaches using gaseous zirconium "halide", with no mention of zirconium fluoride. Smith has no relevant

teaching.

Claim 15 recites in part: "the modifying element is hafnium tetrafluoride", meaning that the solid form of the modifying element in claim 12 is solid hafnium tetrafluoride. None of the references has any such teaching. Warnes teaches using gaseous hafnium chloride, not solid hafnium tetrafluoride. Basta '963 teaches using gaseous hafnium "halide", with no mention of hafnium fluoride. Smith has no relevant teaching.

Claim 16 recites in part: "the aluminum halide is aluminum trifluoride". In this claim, the solid aluminum halide in the coating source of claim 12 must be solid aluminum trifluoride. Warnes teaches the use of gaseous aluminum trichloride. Basta '963 teaches gaseous aluminum trifluoride but not solid aluminum trifluoride, and Smith has no teaching of aluminum trifluoride at any location. Claim 16 further recites in part: "the fluoride of the modifying element is zirconium tetrafluoride", meaning that the solid form of the modifying element in claim 12 is solid zirconium tetrafluoride. None of the references has any such teaching. Warnes teaches using gaseous zirconium chloride, not solid zirconium tetrafluoride. Basta '963 teaches using gaseous zirconium "halide", with no mention of zirconium fluoride. Smith has no relevant teaching. Claim 16 further recites in part: "the weight ratio of aluminum trifluoride to zirconium tetrafluoride is from about 1.4:1 to about 3:1." There is no teaching of this limitation in any of the references, and the explanation of the rejection (page 5, lines 5-6) agrees that there is not (Office Action, page 5, lines 13-14). The discussion in the last full paragraph of page 5 and the paragraph bridging pages 5-6 of the Office Action is creative but not supported by the teachings of the art. The discussion is based on Warnes '733 at col. 6, lines 5-37, which is said to provide "Hf as the major modifying element". In this teaching, hafnium tetrachloride is formed by passing hydrogen chloride over elemental hafnium. There is no teaching of a hafnium fluoride, so the attempt to extend the analysis of the chloride form to the fluoride form is just meaningless.

Claim 17 recites in part: "the coating source further includes elemental solid

aluminum". Warnes teaches the presence of elemental solid aluminum in its approach for generating aluminum trichloride. However, recall that the rejection of claim 12 was developed by incorporating the argument that "it would have been obvious...to have provided the metal halide by physical evaporation instead of by reaction of metal with HCl..." (Office Action, page 3, lines 21-23, incorporated at page 4, lines 22-23). The formation of the rejection can't have it both ways--eliminate the metal to try to form the rejection of claim 12, but then try to bring it back to try to reject claim 17. The two gas-producing technologies are redundant, and there is no reason to use both of them. The explanation of the rejection argues that it would be obvious to use both methods together, but that won't work technically. As stated at col. 4, lines 39-40 of Basta '963, when hydrogen fluoride gas is passed over aluminum pellets to make aluminum trifluoride, the pellets are at 90°C. This is well below the melting point (much less the boiling point) of solid aluminum trifluoride, so the aluminum trifluoride won't vaporize the 90°C mandated for aluminum pellets. So the two processes are not physically compatible.

Claim 18 recites in part: "the coating source further includes an elemental solid modifying element". Warnes teaches the presence of the elemental solid modifying element in its approach for generating the trichloride of the modifying element. However, recall that the rejection of claim 12 was developed by arguing that "it would have been obvious...to have provided the metal halide by physical evaporation instead of by reaction of metal with HCl..." (Office Action, page 4, lines 2-5, incorporated at page 4, lines 22-23). The formation of the rejection can't have it both ways--eliminate the metal to try to form the rejection of claim 12, but then try to bring it back to reject claim 18. The two gas-producing technologies are redundant, and there is no reason to use both of them.

Claim 19 recites in part: "the step of preparing the coating source includes the step of providing the solid fluoride or the solid iodide of the modifying element separated from the article surface". As noted earlier, none of the references has any teaching of a solid fluoride or a solid iodide of the modifying element (hafnium or zirconium). There may therefore be no teaching of the limitation of claim 19, since there is no solid form of either

of these compounds. The explanation of the rejection (Office Action page 5, lines 9-11) seems to presuppose that there is such a teaching in the references, but there is not.

Claim 20 recites in part: "the step of preparing the coating source includes the step of providing the fluoride or the iodide of the modifying element applied directly to the article surface". The references do not teach solid fluorides or iodides of the modifying elements, as discussed earlier. According to the recitation of claim 12, the fluoride or iodide in the coating source is a solid. The argument presented in the explanation of the rejection (Office Action, page 5, line 12), "The precursor then flows to (i.e., is applied to) the substrate." is not technically possible, because the solid components of the coating source cannot "flow to" the substrate--they are solids.

Applicant incorporates the discussion from Issue 1 of the need for an objective basis for combining the teachings of the references, except that the need here is even more acute, since there are now four applied references.

Issue 3. Are claims 1, 3, 5-7, 9, 11-12, 15, 17-18 and 20 properly rejected under 35 USC § 103 over Chang '642, Speirs '806, and Bornstein '023?

Chang '642 teaches an entirely different type of coating process. Instead of using a solid aluminum halide as recited in the present claims, Chang '642 uses solid metal powder coated onto the surface of the article and ammonium fluoride (Chang '642 claim 1, Examples in col. 4). The explanation of the rejection recognizes that Chang '642 has no teaching of the use of aluminum halide, and no teaching of the use of a carrier gas (Office Action, page 6, lines 17-18).

Speirs '806 teaches a coating mixture of elemental aluminum (not an aluminum compound) and aluminum oxide, mixed with aluminum chloride and (not or) ammonium chloride (col. 4, lines 47-63), not ammonium fluoride as in Chang '642. The explanation of the rejection asserts (page 6, lines 20-21) that Speirs "'806 teaches the equivalence of

ammonium halide and aluminum halides as energizers...(col. 3, lines 47-63)". Applicant is really puzzled as to how the Examiner reads Speirs '806 as having such a teaching of "equivalence". The referenced portion says no such thing, and in fact these families of halides are not taught to be equivalents as energizers at all--that's why both are needed in the process taught by Speirs '806 (see claim 1 of Speirs '806, for example). Members of the two families of halides may be mixed together, but they are not equivalents and there is nothing of record that supports the assertion of "equivalence". Speirs '806 makes it clear that these are not equivalents, see col. 3, lines 1-8, because both are needed.

Accordingly, there is no teaching of the limitation of claim 1:

"producing a coating gas from the coating source, the coating gas comprising a gaseous aluminum halide, a gaseous fluoride or a gaseous iodide of the modifying element, and the carrier gas"

Claims 3, 5, 6 stand or fall with claim 1.

Claim 7 recites in part: "the coating source further includes an elemental solid modifying element". There is no such teaching in any of the references. There is no teaching that elemental hafnium may be used with hafnium tetrafluoride.

Claims 9 and 11 stand or fall with claim 1.

Claim 12 recites in part:

"providing the article having a surface, the article being an airfoil;
preparing a coating source comprising:
a solid aluminum halide,
a solid fluoride of a modifying element as a source of the modifying element, the fluoride of the modifying element being selected from the group consisting of a zirconium fluoride and a hafnium fluoride, and combinations thereof, and
a carrier gas;
producing a coating gas from the coating source, the coating gas comprising a gaseous aluminum halide, a gaseous fluoride of the modifying element, and the carrier gas"

There is no teaching of this limitation of claim 12, for the reasons stated earlier. The suggestion of "equivalence" of ammonium chloride and aluminum trichloride is not supported by Speirs '806.

Claims 15 and 17 stand or fall with claim 12.

Claim 18 recites in part: "the coating source further includes an elemental solid modifying element". There is no such teaching in any of the references. There is no teaching that elemental hafnium may be used with hafnium tetrafluoride.

Claim 20 stands or falls with claim 12.

No objective basis is set forth in the rejection or in the references for combining the teachings of the references, and Applicant incorporates the discussion of this requirement from Issue 1.

SUMMARY AND CONCLUSION

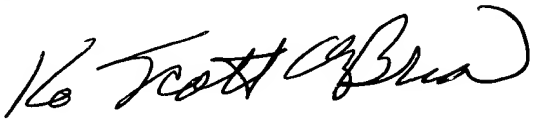
Under Issues 1 and 2, there is no teaching of "a solid fluoride or a solid iodide of a modifying element as a source of the modifying element, the modifying element being selected from the group consisting of zirconium, hafnium, and yttrium, and combinations thereof", as recited in claim 1 and in a narrower form in claim 12. Consequently, there can be no teaching of "a coating source comprising a solid aluminum halide, a solid fluoride or a solid iodide of a modifying element..., and a carrier gas", as recited in claim 1.

Under Issue 3, the rejection is built on the assertion that ammonium chloride is equivalent to aluminum chloride, which is unsupported in the art. In fact, by requiring that both ammonium chloride and aluminum chloride must be present, Speirs '806 teaches that they are not the same. And again, there is an attempt to blur the distinction between ammonium chloride, as taught by Speirs '806, and ammonium fluoride, as taught by Chang '642.

Attorney Docket No. 13DV-13658/11593 (21635-0026)
Application No. 09/670,189

The Commissioner is hereby authorized to charge indicated fees and credit any overpayments to Deposit Account No. 50-1059.

Respectfully submitted,
McNees Wallace & Nurick LLC



Dated: October 21, 2003

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APPENDIX

Clean Copy of Appealed Claims

1. A method for coating an article, comprising the steps of:

providing the article having a surface;

preparing a coating source comprising:

a solid aluminum halide,

a solid fluoride or a solid iodide of a modifying element as a source of the modifying element, the modifying element being selected from the group consisting of zirconium, hafnium, and yttrium, and combinations thereof, and

a carrier gas;

producing a coating gas from the coating source, the coating gas comprising a gaseous aluminum halide, a gaseous fluoride or a gaseous iodide of the modifying element, and the carrier gas; and

contacting the coating gas to the article; and simultaneously

heating the coating gas and the article to a coating temperature of at least about 1850°F for a period of time sufficient to permit aluminum and the modifying element to coat onto the surface of the article.

2. The method of claim 1, wherein the step of providing the article includes the step of

providing the article with a platinum-enriched surface region thereon.

3. The method of claim 1, wherein the article is an airfoil made of a nickel-base superalloy.

4. The method of claim 1, wherein the aluminum halide is aluminum trifluoride.

5. The method of claim 1, wherein the fluoride of the modifying element is used, and the fluoride of the modifying element is a tetrafluoride of the modifying element.

6. The method of claim 1, wherein the coating source further includes elemental solid aluminum.

7. The method of claim 1, wherein the coating source further includes an elemental solid modifying element.

8. The method of claim 1, wherein the step of preparing the coating source includes the step of

providing the solid fluoride or the solid iodide of the modifying element separated from the article surface.

9. The method of claim 1, wherein the step of preparing the coating source includes the step of

providing the fluoride or the iodide of the modifying element applied directly to the article surface.

10. The method of claim 1, wherein the modifying element is zirconium.

11. The method of claim 1, wherein the modifying element is hafnium.

12. A method for coating an article, comprising the steps of:

providing the article having a surface, the article being an airfoil;

preparing a coating source comprising:

a solid aluminum halide,

a solid fluoride of a modifying element as a source of the modifying element, the fluoride of the modifying element being selected from the group consisting of a zirconium fluoride and a hafnium fluoride, and combinations thereof, and

a carrier gas;

producing a coating gas from the coating source, the coating gas comprising a gaseous aluminum halide, a gaseous fluoride of the modifying element, and the carrier gas; and

contacting the coating gas to the surface of the airfoil; and simultaneously

heating the coating gas and the article to a coating temperature of from about 1850°F to about 2000°F for a period of time sufficient to permit aluminum and the modifying element to coat onto the surface of the airfoil.

13. The method of claim 12, wherein the step of providing the article includes the step of

providing the article with a platinum-enriched surface region thereon.

14. The method of claim 12, wherein the fluoride of the modifying element is zirconium tetrafluoride.

15. The method of claim 12, wherein the fluoride of the modifying element is hafnium tetrafluoride.

16. The method of claim 12, wherein the aluminum halide is aluminum trifluoride, the fluoride of the modifying element is zirconium tetrafluoride, and the weight ratio of aluminum trifluoride to zirconium tetrafluoride is from about 1.4:1 to about 3:1.

17. The method of claim 12, wherein the coating source further includes elemental solid aluminum.

18. The method of claim 12, wherein the coating source further includes an elemental solid modifying element.

19. The method of claim 12, wherein the step of preparing the coating source includes the step of

providing the solid fluoride of the modifying element separated from the airfoil surface.

20. The method of claim 12, wherein the step of preparing the coating source includes the step of

providing the fluoride of the modifying element applied directly to the airfoil surface.

Attorney Docket No. 13DV-13658/11593 (21635-0026)
Application No. 09/670,189

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re application of WHEAT et al.	)	
	)	Group Art Unit: 1762
Application No.: 09/670,189	)	
	)	Examiner: Cleveland
Filed: September 26, 2000	)	
	)	

For: METHOD FOR VAPOR PHASE ALUMINIDING INCLUDING A MODIFYING ELEMENT

APPEAL BRIEF

Mail Stop APPEAL BRIEF - PATENTS
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Applicant files its Appeal Brief in triplicate, together with a Fee Transmittal authorizing the charging of the required fee. A Notice of Appeal and fee were previously filed.

Real Party in Interest

The real party in interest is General Electric Company.

Related Appeals and Interferences

Applicant is not aware of any related appeals and/or interferences.

Status of Claims

Claims 1-20 were filed. During prosecution, claims 1, 7-9, 12, and 18-20 were amended. Claims 1-20 are pending, and all claims are rejected. The rejection of all of the claims is appealed. A clean copy of the appealed claims is found in the Appendix hereto.

Status of Amendments

An Amendment After Final Rejection was filed and was entered, per the Advisory Action of October 8, 2003.

Summary of Invention

In an aircraft gas turbine engine, air is drawn into the front of the engine and compressed by an axial-flow compressor. The air is mixed with fuel, and the mixture burned in the combustors. The hot combustion gas flows axially from the combustors and through a turbine. The turbine causes a shaft to turn, and this shaft drives the compressor. The hot exhaust gas flows from the back of the engine. [first paragraph of the Background section of the Specification].

The turbine blades 20 (Figure 2, presented as an example of article of interest), against which the hot combustion gas impacts, are typically made of a nickel-base superalloy substrate 42 covered with an aluminum-containing protective layer 40, 46. The protective layer 40, 46 oxidizes to form a surface scale 43 of aluminum oxide, which protects the protective layer 40, 46 and the underlying superalloy substrate 42 against further oxidation and corrosion damage.

The present invention deals with the method by which the aluminum-containing protective layer 40 or 46 is deposited. Referring to claim 1 and the discussion associated with Figure 3, the uncoated article, in the preferred case the turbine blade 20, is provided. A coating source is prepared. The coating source comprises (1) a solid aluminum halide,

(2) a solid fluoride or a solid iodide of a modifying element as a source of the modifying element, where the modifying element is zirconium, hafnium, or yttrium, or combinations thereof, and (3) a carrier gas. A coating gas is produced from the coating source. The coating gas comprises a gaseous aluminum halide, a gaseous fluoride or a gaseous iodide of the modifying element, and the carrier gas. The coating gas is contacted to the article, and simultaneously the coating gas and the article are heated to a coating temperature of at least about 1850°F for a period of time sufficient to permit aluminum and the modifying element to coat onto the surface of the article. This coating operation is conveniently performed in an apparatus such as that of Figures 4 or 5.

Issues

Issue 1. Are claims 1-2 and 4-11 properly rejected under 35 USC 103 over Warnes '733 in view of Basta '963 and Smith '400?

Issue 2. Are claims 3 and 12-20 properly rejected under 35 USC 103 over Warnes '733 in view of Basta '963 and Smith '400, and further in view of Basta '614?

Issue 3. Are claims 1, 3, 5-7, 9, 11-12, 15, 17-18 and 20 properly rejected under 35 USC 103 over Chang '642, Speirs '806, and Bornstein '023?

Grouping of Claims

The claims do not stand or fall together, except as stated next.

Under Issue 1, claim 2 stands or falls with claim 1.

Under Issue 2, claim 13 stands or falls with claim 12.

Under Issue 3, claims 3, 5, 6, 9, and 11 stand or fall with claim 1.

Under Issue 3, claims 15, 17, and 20 stand or fall with claim 12.

Argument

References to the "Office Action" are to the final Office Action of April 25, 2003.

Issue 1. Are claims 1-2 and 4-11 properly rejected under 35 USC 103 over Warnes '733 in view of Basta '963 and Smith '400?

Warnes '733 teaches (col. 6, lines 12-37) depositing an aluminum-containing layer by passing a mixture of hydrogen and hydrogen chloride gases over a source of aluminum and a source of silicon to produce a mixture of aluminum trichloride and silicon tetratrichloride. Separately, a mixture of argon and hydrogen chloride gases are flowed over a hafnium/zirconium bed (hafnium and zirconium are the modifying elements) to form a gaseous mixture containing hafnium tetrachloride gas and zirconium trichloride gas. The two gas mixtures, one containing aluminum trichloride and silicon tetratrichloride, and the other containing hafnium tetrachloride gas and zirconium trichloride gas, are introduced concurrently into a coating retort that contains the article to be coated. Warnes thus teaches that the aluminum trichloride, the hafnium tetrachloride, and the zirconium trichloride are never in a solid form, directly contrary to the recitations of the claims.

Basta '963 teaches that "hafnium halides" and "zirconium halides" may be present in a coating system in gaseous form (col. 9, lines 27-28), not solid form as recited in the claims. The explanation of the rejection (sentence bridging pages 3-4 of the Office Action) mischaracterizes Basta '963 as teaching that "...metal fluorides, including those of aluminum, hafnium, and zirconium, may be used as CVD precursors". This statement is not correct. There is no teaching, anywhere in Basta '963 or the other art of record, mentioning hafnium fluoride or zirconium fluoride, possible compounds within the scope of the present claims.

There is a temptation in the enthusiasm of attempting to construct a hindsight rejection of a claim, to which the present explanation of the rejection has fallen victim, to blur the distinction between different types of halides. In fact, the present Specification states unequivocally, "The chlorides and bromides of the modifying element are not within the scope of the present invention, as they are not thermodynamically and kinetically suitable." and "The iodides of the modifying elements may be used in some circumstances,

but the chlorides and bromides are unsuitable and may not be used." So it is not sufficient to argue that Basta '963 or other references teach "halides" of hafnium or zirconium, but in fact they must expressly teach fluorides and/or iodides, because the present Specification distinguishes between different types of halides.

Smith '400 teaches an approach for depositing kappa aluminum oxide (col. 5, lines 14-37). In that process, aluminum chloride is generated by evaporation of the solid or liquid, or reaction of aluminum metal with chlorine or hydrogen chloride. The resulting aluminum chloride is mixed with water vapor and titanium tetrachloride gas. The mixture is passed into a reaction chamber and contacted to a sintered cemented carbide, resulting in the deposition of kappa aluminum oxide on the sintered cemented carbide.

The following principle of law applies to all Section 103 rejections. MPEP 2143.03 provides, "To establish prima facie obviousness of a claimed invention, all claim limitations must be taught or suggested by the prior art. In re Royka, 490 F2d 981, 180 USPQ 580 (CCPA 1974). All words in a claim must be considered in judging the patentability of that claim against the prior art. In re Wilson, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970)." [emphasis added] That is, to have any expectation of rejecting the claims over a single reference or a combination of references, each limitation must be taught somewhere in the applied prior art. If limitations are not found in any of the applied prior art, the rejection cannot stand. In this case, the applied prior art references clearly do not arguably teach some limitations of the claims.

Claim 1 recites in part:

> "preparing a coating source comprising:
>
> a solid aluminum halide,
>
> a solid fluoride or a solid iodide of a modifying element as a source of the modifying element, the modifying element being selected from the group consisting of zirconium, hafnium, and yttrium, and

combinations thereof, and

a carrier gas;

producing a coating gas from the coating source, the coating gas comprising a gaseous aluminum halide, a gaseous fluoride or a gaseous iodide of the modifying element, and the carrier gas;"

There is no teaching in any of the references of "a coating source comprising a solid aluminum halide, a solid fluoride or a solid iodide of a modifying element..., and a carrier gas." Warnes teaches that the aluminum trichloride, the hafnium tetrachloride, and the zirconium trichloride are present only as gases. None of these compounds are ever present as solids. Smith is relied upon for a teaching that aluminum halide gas may be produced by evaporating the solid aluminum halide in a completely different application, but there is no teaching regarding a solid fluoride or a solid iodide of a modifying element. There is also no reason to substitute the approach of Smith for that taught by Warnes. Basta '963 is relied upon for a teaching of "metal fluorides, including those of aluminum, hafnium, and zirconium", but there is no such teaching in Basta '963. Basta '963 teaches aluminum trifluoride and "hafnium halides" and "zirconium halides", in gaseous form (col. 8, lines 23-32). Basta '963 has absolutely no teaching of hafnium fluoride, zirconium fluoride, hafnium iodide, or zirconium iodide, either in a solid or even a gaseous form.

In short, there is no teaching, in any of the references, of "a solid fluoride or a solid iodide of a modifying element as a source of the modifying element, the modifying element being selected from the group consisting of zirconium, hafnium, and yttrium, and combinations thereof", as recited in claim 1. Consequently, there can be no teaching of "a coating source comprising a solid aluminum halide, a solid fluoride or a solid iodide of a modifying element..., and a carrier gas", as recited in claim 1.

The distinction between whether the modifying element is initially provided in the coating source in a solid or gaseous form is an important one. The use of a gaseous coating source requires special apparatus to generate the gas, which is then supplied to the coating

apparatus. When a solid aluminum halide and a solid source of the modifying element are used, the solids may be placed directly into the coating apparatus or placed directly in contact with the surface to be coated.

Turning to the dependent claims, claim 2 stands or falls with claim 1.

Claim 4 recites in part: "the aluminum halide is aluminum trifluoride", meaning that the solid aluminum halide in the coating source of claim 1 is solid aluminum trifluoride. Warnes teaches the use of gaseous aluminum trichloride. Basta '963 teaches gaseous aluminum trifluoride but not solid aluminum trifluoride, and Smith has no teaching of aluminum trifluoride at any location.

Claim 5 recites in part: "the fluoride of the modifying element is used, and the fluoride of the modifying element is a tetrafluoride of the modifying element", meaning that the solid form of the modifying element in claim 1 is a solid tetrafluoride of the modifying element. None of the references has any such teaching. Warnes teaches using gaseous chlorides of zirconium and hafnium. Basta '963 teaches using gaseous "halides" of zirconium and hafnium, with no mention of fluorides. Smith has no relevant teaching.

Claim 6 recites in part: "the coating source further includes elemental solid aluminum". Warnes teaches the presence of elemental solid aluminum in its approach for generating aluminum trichloride. However, recall that the rejection of claim 1 was developed by arguing that "it would have been obvious...to have provided the metal halide by physical evaporation instead of by reaction of metal with HCl..." (Office Action, page 3, lines 21-23). The formation of the rejection can't have it both ways--eliminate the metal to try to form the rejection of claim 1, but then bring it back to try to reject claim 6. The two gas-producing technologies are redundant, and there is no reason to use both of them. The explanation of the rejection argues that it would be obvious to use both methods together, but that won't work technically. As stated at col. 4, lines 39-40 of Basta '963, when hydrogen fluoride gas is passed over aluminum pellets to make aluminum trifluoride, the

pellets are at 90°C. This is well below the melting point (much less the boiling point) of solid aluminum trifluoride, so the aluminum trifluoride won't vaporize at the 90°C mandated for reaction of the aluminum pellets. So the two processes are not physically compatible.

Claim 7 recites in part: "the coating source further includes an elemental solid modifying element". Warnes teaches the presence of the elemental solid modifying element in its approach for generating the trichloride of the modifying element. However, recall that the rejection of claim 1 was developed by arguing that "it would have been obvious...to have provided the metal halide by physical evaporation instead of by reaction of metal with HCl..." (Office Action, page 4, lines 2-5). The formation of the rejection can't have it both ways--eliminate the metal to try to form the rejection of claim 1, but then try to bring it back to reject claim 7. The two gas-producing technologies are redundant, and there is no reason to use both of them.

Claim 8 recites in part: "the step of preparing the coating source includes the step of providing the solid fluoride or the solid iodide of the modifying element separated from the article surface". As noted earlier, none of the references has any teaching of a solid fluoride or a solid iodide of the modifying element (hafnium or zirconium). There may therefore be no teaching of the limitation of claim 8, since there is no solid form of either of these compounds. The explanation of the rejection (Office Action page 4, lines 15-18) seems to presuppose that there is such a teaching in the references, but there is not.

Claim 9 recites in part: "the step of preparing the coating source includes the step of providing the fluoride or the iodide of the modifying element applied directly to the article surface". The references do not teach solid fluorides or iodides of the modifying elements, as discussed earlier. According to the recitation of claim 1, the fluoride or iodide in the coating source is a solid. The argument presented in the explanation of the rejection (Office Action, page 4, line 18), "The precursor then flows to (i.e., is applied to) the substrate." is not technically possible, because the solid components of the coating source

cannot "flow to" the substrate--they are solids.

Claim 10 recites in part: "the modifying element is zirconium". This is the modifying element that is recited in claim 1 to be provided in the form of a solid fluoride or a solid iodide. None of the references have any teaching of a solid fluoride or iodide of zirconium.

Claim 11 recites in part: "the modifying element is hafnium". This is the modifying element that is recited in claim 1 to be provided in the form of a solid fluoride or a solid iodide. None of the references have any teaching of a solid fluoride or iodide of hafnium.

The present rejection seeks to perform a hindsight reconstruction based upon unrelated references, which is technically unsupported and is legally improper. The case authority and the MPEP provide guidance on this point. The present rejection is a Section 103 combination rejection. It is well established that a proper Section 103 combination rejection requires more than just finding in the references the elements recited in the claim (but which was not done here). To reach a proper teaching of an article or process through a combination of references, there must be stated an objective motivation to combine the teachings of the references, not a hindsight rationalization in light of the disclosure of the specification being examined. MPEP 2143 and 2143.01. See also, for example, In re Fine, 5 USPQ2d 1596, 1598 (at headnote 1) (Fed.Cir. 1988), In re Laskowski, 10 USPQ2d 1397, 1398 (Fed.Cir. 1989), W.L. Gore & Associates v. Garlock, Inc., 220 USPQ 303, 311-313 (Fed. Cir. 1983), and Ex parte Levengood, 28 USPQ2d 1300 (Board of Appeals and Interferences, 1993); Ex parte Chicago Rawhide Manufacturing Co., 223 USPQ 351 (Board of Appeals 1984). As stated in In re Fine at 5 USPQ2d 1598:

> "The PTO has the burden under section 103 to establish a prima facie case of obviousness. [citation omitted] It can satisfy this burden only by showing some objective teaching in the prior art or that knowledge

> generally available to one of ordinary skill in the art would lead that individual to combine the relevant teachings of the references."

And, at 5 USPQ2d 1600:

> "One cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention."

Following this authority, the MPEP states that the examiner must provide such an objective basis for combining the teachings of the applied prior art. In constructing such rejections, MPEP 2143.01 provides specific instructions as to what must be shown in order to extract specific teachings from the individual references:

> "Obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention when there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. In re Fine, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988); In re Jones, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992)."
>
> * * * * *
>
> "The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination." In re Mills, 916 F.2d 680, 16 USPQ2d 1430 (Fed. Cir. 1990)."
>
> * * * * *
>
> "A statement that modifications of the prior art to meet the claimed invention would have been 'well within the ordinary skill of the art at the time the claimed invention was made' because the references relied upon teach that all aspects of the claimed invention were individually known in the art is not sufficient to establish a prima facie case of obviousness

without some objective reason to combine the teachings of the references. Ex parte Levengood, 28 USPQ2d 1300 (Bd.Pat.App.& Inter. 1993)."

Here, there is set forth no objective basis for combining the teachings of the references in the manner used by this rejection, and selecting the helpful portions from each reference while ignoring the unhelpful portions. An objective basis is one set forth in the art or which can be established by a declaration, not one that can be developed in light of the present disclosure. The various processes of the three references are not technically compatible for reasons discussed earlier, and no reason is suggested for combining the teachings.

Issue 2. Are claims 3 and 12-20 properly rejected under 35 USC § 103 over Warnes '733 in view of Basta '963 and Smith '400, and further in view of Basta '614?

Applicant incorporates the prior discussion of Issue 1 in regard to the rejections formed of the combination of Warnes '733, Basta '963, and Smith '400. Basta '614 is relied upon for its teaching of applying coatings to airfoils.

Claim 3 depends from claim 1, and incorporates the limitation quoted above from claim 1. The combination of Warnes '733, Basta '963, and Smith '400 do not teach these limitations, and Basta '614 adds nothing in this regard. Basta '614 uses a coating approach like that of Warnes '733, in which the aluminum trichloride gas is formed external to the coating retort by passing hot gas over pure aluminum (col. 4, lines 33-43). Claim 3 is allowable over this ground of rejection.

Claim 12 recites in part:

> "preparing a coating source comprising:
>
> a solid aluminum halide,
>
> a solid fluoride of a modifying element as a source of the modifying element, the fluoride of the modifying element being selected from the group consisting of a zirconium fluoride and a hafnium fluoride, and combinations thereof, and
>
> a carrier gas;
>
> producing a coating gas from the coating source, the coating gas comprising a gaseous aluminum halide, a gaseous fluoride or a gaseous iodide of the modifying element, and the carrier gas;"

The combination of Warnes '733, Basta '963 and Smith '400 does not teach this limitation for the reasons discussed earlier. Applicant incorporates by reference the earlier discussion of the rejection of Issue 1. Basta '614 adds nothing in this regard, as it teaches the same thing as Warnes '744 in respect to the coating process.

Basta '614 is applied for its teaching of the use of platinum to make platinum aluminide coatings. Applicant does not dispute the fact that platinum aluminide coatings are known in the art on nickel-base superalloy airfoils. Basta '614 does not, however, remedy the absence of teachings in the other three references.

Claim 13 stands or falls with claim 12.

Claim 14 recites in part: "the modifying element is zirconium tetrafluoride", meaning that the solid form of the modifying element in claim 12 is solid zirconium tetrafluoride. None of the references has any such teaching. Warnes teaches using gaseous zirconium chloride, not solid zirconium tetrafluoride. Basta '963 teaches using gaseous zirconium "halide", with no mention of zirconium fluoride. Smith has no relevant

teaching.

Claim 15 recites in part: "the modifying element is hafnium tetrafluoride", meaning that the solid form of the modifying element in claim 12 is solid hafnium tetrafluoride. None of the references has any such teaching. Warnes teaches using gaseous hafnium chloride, not solid hafnium tetrafluoride. Basta '963 teaches using gaseous hafnium "halide", with no mention of hafnium fluoride. Smith has no relevant teaching.

Claim 16 recites in part: "the aluminum halide is aluminum trifluoride". In this claim, the solid aluminum halide in the coating source of claim 12 must be solid aluminum trifluoride. Warnes teaches the use of gaseous aluminum trichloride. Basta '963 teaches gaseous aluminum trifluoride but not solid aluminum trifluoride, and Smith has no teaching of aluminum trifluoride at any location. Claim 16 further recites in part: "the fluoride of the modifying element is zirconium tetrafluoride", meaning that the solid form of the modifying element in claim 12 is solid zirconium tetrafluoride. None of the references has any such teaching. Warnes teaches using gaseous zirconium chloride, not solid zirconium tetrafluoride. Basta '963 teaches using gaseous zirconium "halide", with no mention of zirconium fluoride. Smith has no relevant teaching. Claim 16 further recites in part: "the weight ratio of aluminum trifluoride to zirconium tetrafluoride is from about 1.4:1 to about 3:1." There is no teaching of this limitation in any of the references, and the explanation of the rejection (page 5, lines 5-6) agrees that there is not (Office Action, page 5, lines 13-14). The discussion in the last full paragraph of page 5 and the paragraph bridging pages 5-6 of the Office Action is creative but not supported by the teachings of the art. The discussion is based on Warnes '733 at col. 6, lines 5-37, which is said to provide "Hf as the major modifying element". In this teaching, hafnium tetrachloride is formed by passing hydrogen chloride over elemental hafnium. There is no teaching of a hafnium fluoride, so the attempt to extend the analysis of the chloride form to the fluoride form is just meaningless.

Claim 17 recites in part: "the coating source further includes elemental solid

aluminum". Warnes teaches the presence of elemental solid aluminum in its approach for generating aluminum trichloride. However, recall that the rejection of claim 12 was developed by incorporating the argument that "it would have been obvious...to have provided the metal halide by physical evaporation instead of by reaction of metal with HCl..." (Office Action, page 3, lines 21-23, incorporated at page 4, lines 22-23). The formation of the rejection can't have it both ways--eliminate the metal to try to form the rejection of claim 12, but then try to bring it back to try to reject claim 17. The two gas-producing technologies are redundant, and there is no reason to use both of them. The explanation of the rejection argues that it would be obvious to use both methods together, but that won't work technically. As stated at col. 4, lines 39-40 of Basta '963, when hydrogen fluoride gas is passed over aluminum pellets to make aluminum trifluoride, the pellets are at 90°C. This is well below the melting point (much less the boiling point) of solid aluminum trifluoride, so the aluminum trifluoride won't vaporize the 90°C mandated for aluminum pellets. So the two processes are not physically compatible.

Claim 18 recites in part: "the coating source further includes an elemental solid modifying element". Warnes teaches the presence of the elemental solid modifying element in its approach for generating the trichloride of the modifying element. However, recall that the rejection of claim 12 was developed by arguing that "it would have been obvious...to have provided the metal halide by physical evaporation instead of by reaction of metal with HCl..." (Office Action, page 4, lines 2-5, incorporated at page 4, lines 22-23). The formation of the rejection can't have it both ways--eliminate the metal to try to form the rejection of claim 12, but then try to bring it back to reject claim 18. The two gas-producing technologies are redundant, and there is no reason to use both of them.

Claim 19 recites in part: "the step of preparing the coating source includes the step of providing the solid fluoride or the solid iodide of the modifying element separated from the article surface". As noted earlier, none of the references has any teaching of a solid fluoride or a solid iodide of the modifying element (hafnium or zirconium). There may therefore be no teaching of the limitation of claim 19, since there is no solid form of either

of these compounds. The explanation of the rejection (Office Action page 5, lines 9-11) seems to presuppose that there is such a teaching in the references, but there is not.

Claim 20 recites in part: "the step of preparing the coating source includes the step of providing the fluoride or the iodide of the modifying element applied directly to the article surface". The references do not teach solid fluorides or iodides of the modifying elements, as discussed earlier. According to the recitation of claim 12, the fluoride or iodide in the coating source is a solid. The argument presented in the explanation of the rejection (Office Action, page 5, line 12), "The precursor then flows to (i.e., is applied to) the substrate." is not technically possible, because the solid components of the coating source cannot "flow to" the substrate--they are solids.

Applicant incorporates the discussion from Issue 1 of the need for an objective basis for combining the teachings of the references, except that the need here is even more acute, since there are now four applied references.

Issue 3. Are claims 1, 3, 5-7, 9, 11-12, 15, 17-18 and 20 properly rejected under 35 USC § 103 over Chang '642, Speirs '806, and Bornstein '023?

Chang '642 teaches an entirely different type of coating process. Instead of using a solid aluminum halide as recited in the present claims, Chang '642 uses solid metal powder coated onto the surface of the article and ammonium fluoride (Chang '642 claim 1, Examples in col. 4). The explanation of the rejection recognizes that Chang '642 has no teaching of the use of aluminum halide, and no teaching of the use of a carrier gas (Office Action, page 6, lines 17-18).

Speirs '806 teaches a coating mixture of elemental aluminum (not an aluminum compound) and aluminum oxide, mixed with aluminum chloride and (not or) ammonium chloride (col. 4, lines 47-63), not ammonium fluoride as in Chang '642. The explanation of the rejection asserts (page 6, lines 20-21) that Speirs "'806 teaches the equivalence of

ammonium halide and aluminum halides as energizers...(col. 3, lines 47-63)". Applicant is really puzzled as to how the Examiner reads Speirs '806 as having such a teaching of "equivalence". The referenced portion says no such thing, and in fact these families of halides are not taught to be equivalents as energizers at all--that's why both are needed in the process taught by Speirs '806 (see claim 1 of Speirs '806, for example). Members of the two families of halides may be mixed together, but they are not equivalents and there is nothing of record that supports the assertion of "equivalence". Speirs '806 makes it clear that these are not equivalents, see col. 3, lines 1-8, because both are needed.

Accordingly, there is no teaching of the limitation of claim 1:

"producing a coating gas from the coating source, the coating gas comprising a gaseous aluminum halide, a gaseous fluoride or a gaseous iodide of the modifying element, and the carrier gas"

Claims 3, 5, 6 stand or fall with claim 1.

Claim 7 recites in part: "the coating source further includes an elemental solid modifying element". There is no such teaching in any of the references. There is no teaching that elemental hafnium may be used with hafnium tetrafluoride.

Claims 9 and 11 stand or fall with claim 1.

Claim 12 recites in part:

"providing the article having a surface, the article being an airfoil;
preparing a coating source comprising:
a solid aluminum halide,
a solid fluoride of a modifying element as a source of the modifying element, the fluoride of the modifying element being selected from the group consisting of a zirconium fluoride and a hafnium fluoride, and combinations thereof, and
a carrier gas;
producing a coating gas from the coating source, the coating gas comprising a gaseous aluminum halide, a gaseous fluoride of the modifying element, and the carrier gas"

There is no teaching of this limitation of claim 12, for the reasons stated earlier. The suggestion of "equivalence" of ammonium chloride and aluminum trichloride is not supported by Speirs '806.

Claims 15 and 17 stand or fall with claim 12.

Claim 18 recites in part: "the coating source further includes an elemental solid modifying element". There is no such teaching in any of the references. There is no teaching that elemental hafnium may be used with hafnium tetrafluoride.

Claim 20 stands or falls with claim 12.

No objective basis is set forth in the rejection or in the references for combining the teachings of the references, and Applicant incorporates the discussion of this requirement from Issue 1.

SUMMARY AND CONCLUSION

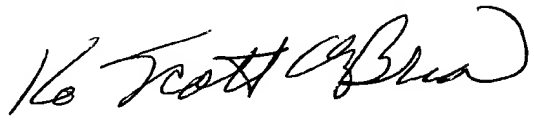
Under Issues 1 and 2, there is no teaching of "a solid fluoride or a solid iodide of a modifying element as a source of the modifying element, the modifying element being selected from the group consisting of zirconium, hafnium, and yttrium, and combinations thereof", as recited in claim 1 and in a narrower form in claim 12. Consequently, there can be no teaching of "a coating source comprising a solid aluminum halide, a solid fluoride or a solid iodide of a modifying element..., and a carrier gas", as recited in claim 1.

Under Issue 3, the rejection is built on the assertion that ammonium chloride is equivalent to aluminum chloride, which is unsupported in the art. In fact, by requiring that both ammonium chloride and aluminum chloride must be present, Speirs '806 teaches that they are not the same. And again, there is an attempt to blur the distinction between ammonium chloride, as taught by Speirs '806, and ammonium fluoride, as taught by Chang '642.

Attorney Docket No. 13DV-13658/11593 (21635-0026)
Application No. 09/670,189

The Commissioner is hereby authorized to charge indicated fees and credit any overpayments to Deposit Account No. 50-1059.

Respectfully submitted,
McNees Wallace & Nurick LLC



Dated: October 21, 2003

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APPENDIX

Clean Copy of Appealed Claims

1. A method for coating an article, comprising the steps of:

providing the article having a surface;

preparing a coating source comprising:

a solid aluminum halide,

a solid fluoride or a solid iodide of a modifying element as a source of the modifying element, the modifying element being selected from the group consisting of zirconium, hafnium, and yttrium, and combinations thereof, and

a carrier gas;

producing a coating gas from the coating source, the coating gas comprising a gaseous aluminum halide, a gaseous fluoride or a gaseous iodide of the modifying element, and the carrier gas; and

contacting the coating gas to the article; and simultaneously

heating the coating gas and the article to a coating temperature of at least about 1850°F for a period of time sufficient to permit aluminum and the modifying element to coat onto the surface of the article.

2. The method of claim 1, wherein the step of providing the article includes the step of

providing the article with a platinum-enriched surface region thereon.

3. The method of claim 1, wherein the article is an airfoil made of a nickel-base superalloy.

4. The method of claim 1, wherein the aluminum halide is aluminum trifluoride.

5. The method of claim 1, wherein the fluoride of the modifying element is used, and the fluoride of the modifying element is a tetrafluoride of the modifying element.

6. The method of claim 1, wherein the coating source further includes elemental solid aluminum.

7. The method of claim 1, wherein the coating source further includes an elemental solid modifying element.

8. The method of claim 1, wherein the step of preparing the coating source includes the step of

providing the solid fluoride or the solid iodide of the modifying element separated from the article surface.

9. The method of claim 1, wherein the step of preparing the coating source includes the step of

providing the fluoride or the iodide of the modifying element applied directly to the article surface.

10. The method of claim 1, wherein the modifying element is zirconium.

11. The method of claim 1, wherein the modifying element is hafnium.

12. A method for coating an article, comprising the steps of:

providing the article having a surface, the article being an airfoil;

preparing a coating source comprising:

a solid aluminum halide,

a solid fluoride of a modifying element as a source of the modifying element, the fluoride of the modifying element being selected from the group consisting of a zirconium fluoride and a hafnium fluoride, and combinations thereof, and

a carrier gas;

producing a coating gas from the coating source, the coating gas comprising a gaseous aluminum halide, a gaseous fluoride of the modifying element, and the carrier gas; and

contacting the coating gas to the surface of the airfoil; and simultaneously

heating the coating gas and the article to a coating temperature of from about 1850°F to about 2000°F for a period of time sufficient to permit aluminum and the modifying element to coat onto the surface of the airfoil.

13. The method of claim 12, wherein the step of providing the article includes the step of

providing the article with a platinum-enriched surface region thereon.

14. The method of claim 12, wherein the fluoride of the modifying element is zirconium tetrafluoride.

15. The method of claim 12, wherein the fluoride of the modifying element is hafnium tetrafluoride.

16. The method of claim 12, wherein the aluminum halide is aluminum trifluoride, the fluoride of the modifying element is zirconium tetrafluoride, and the weight ratio of aluminum trifluoride to zirconium tetrafluoride is from about 1.4:1 to about 3:1.

17. The method of claim 12, wherein the coating source further includes elemental solid aluminum.

18. The method of claim 12, wherein the coating source further includes an elemental solid modifying element.

19. The method of claim 12, wherein the step of preparing the coating source includes the step of

providing the solid fluoride of the modifying element separated from the airfoil surface.

20. The method of claim 12, wherein the step of preparing the coating source includes the step of

providing the fluoride of the modifying element applied directly to the airfoil surface.